

# Claims

[c1] What is claimed is:

1. A projectile launch detection system utilizing a continuous wave radio frequency signal to confirm a muzzle exit of a projectile, the launch detection system comprising:

a continuous wave radio frequency source for generating a continuous wave radio frequency signal;

an antenna for launching a transmitted the continuous wave radio frequency signal down a gun tube toward a boundary at a muzzle of the gun tube between the gun tube and free space;

the antenna receiving a reflected continuous wave radio frequency signal reflected from the boundary;

a mixer for generating a demodulated intermediate frequency signal from the transmitted continuous wave radio frequency signal transmitted and the reflected continuous wave radio frequency signal;

a buffer/amplifier for generating a homodyne signal from the demodulated intermediate frequency signal;

a processing circuit for performing an analysis of the demodulated intermediate frequency signal; and

a decision circuit for determining whether the analysis of

the demodulated intermediate frequency signal constitutes a valid gun launch of the projectile.

- [c2] 2. The launch detection circuit of claim 1, wherein the gun tube appears as a circular wave guide of a specific characteristic impedance to the transmitted continuous wave radio frequency signal.
- [c3] 3. The launch detection circuit of claim 1, wherein the gun tube appears as the circular wave guide of a specific characteristic impedance to the reflected continuous wave radio frequency signal.
- [c4] 4. The launch detection circuit of claim 1, wherein the launch detection circuit is encapsulated and housed within the fuze for reliable performance during a launch of the projectile.
- [c5] 5. The launch detection circuit of claim 1, wherein the projectile is a large caliber tank projectile.
- [c6] 6. The launch detection circuit of claim 1, wherein the projectile is a mortar projectile.
- [c7] 7. The launch detection circuit of claim 1, wherein the projectile is an artillery projectile.
- [c8] 8. The launch detection circuit of claim 1, wherein the projectile is any projectile with fixed fins.

- [c9] 9. The launch detection circuit of claim 1, wherein the projectile is any projectile that does not breath air during launch.
- [c10] 10. The launch detection circuit of claim 1, wherein the projectile is any projectile launched from a smooth bore gun.
- [c11] 11. The launch detection circuit of claim 1, wherein launch detection circuit may also detect a proximity to a target.
- [c12] 12. The launch detection circuit of claim 1, wherein the demodulated intermediate frequency signal is demodulated by a diode and an inductor from the continuous wave radio frequency signal.
- [c13] 13. The launch detection circuit of claim 1, wherein a monolithic microwave integrated circuit performs a function of the continuous wave radio frequency source, the mixer, and the buffer/amplifier